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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 129

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INDO-U.S. MEETING ON NUCLEAR RESEARCH REPORTED

Bombay THE TIMES OF INDIA in English 10 Dec 81 p 9

[Text]

NEW DELHI, December 9.

BASIC nuclear research has been included in the scientific collaboration programme drawn up by India and the U.S.

The three-day meeting of the Indo-U.S. sub-commission on science and technology that included here today agreed to expand the scope of present scientific co-operation. Collaboration in the field of law and medium energy physics, involving the use of accelerators and synchrotron radiation sources, will be undertaken at identified research facilities. Indo-U.S. joint workshops will be held and a seminar on medium energy nuclear physics has been planned for next year.

The sub-commission covered new aspects of solar energy, wind and ocean energy systems, biomass production and conversion, coal technologies, malaria vaccine development, leprosy control, amorphous materials, monsoon meteorology and high pressure geophysics.

INTEGRATED ENERGY SYSTEM

In the area of energy, it was noted that some projects had already been defined for the utilisation of the proposed US aid grant of five million dollars. A joint project for the establishment of an integrated energy system and another on solar collectors are being implemented.

The co-chairmen of the sub-commission meeting were Prof. M. G. K. Menon, secretary, department of science and technology, and Dr. Roger Revelle, noted oceanographer. At a joint press conference, Dr. Revelle said thatbilateral co-operation in the field of science would smoothen problems in other areas of Indo-U.S. relations.

He was asked whether political difficulties would hamper scientific collaboration between the two countries.

Dr. Revelle said there was no such thing as Indian science or American science and what the two countries were concerned about was advancement of science.

Dr. Nyle Brady, director of science and technology bureau of U.S. aid, said science recognised no political boundaries. The Malaria carrying mosquito required no passport to go from India to Bangladesh, he said.

In reply to another question, Prof. Menon said that the sub-commission was concerned with the agreement on nuclear fuel supplies for Tarapur and such other matters. It was concerned with basic sciences.

The sub-commission identified the broad areas and specific projects and then details are left to the scientists and agencies actually involved in the work. It has agreed to hold workshops on diarrheal diseases, fibre optics, minerals and high-resolution laser work.

CSO: 5100/7039

SETHNA SPEAKS ON SELF-RELIANCE IN NUCLEAR ENERGY

New Delhi PATRIOT in English 5 Dec 81 p 10

[Text]

Atomic Energy Commission chairman Dr H N Sethna on Friday called upon the Indian industry to come up to the required level and standard of the nuclear field.

Delivering a lecture on 'self-reliance in nuclear energy' under the aegis of the Krishna Menon Memorial Society in the Capital, the AEC chief said that though the department possessed expertise for planning and setting up nuclear reactors for producing energy and meeting its fuel and other requirements yet in certain areas like electronics, raw materials and special castings, the country has to depend on import.

Dr Sethna said the industry has the capacity but lacks the will.

Elaborating further with instances, he said that though the department has adequate expertise for design and construction of the control system of reactors including fabrication of complex control and drive mechanisms, yet these systems are integrated out of modern electronic components that are still to be produced in the country.

Dr Sethna explained the methods to produce nuclear energy and the type of feul required while delivering the lecture.

He said that the country would in the next few years have enough heavy water from the various plants set up, to meet the requirement of nuclear programme.

Asked what fuel would now be used for the Tarapur reactor, he answered that a mixed oxide of plutonium and uranium would be used while thorium would play an important role once the country's fast-breeder reactors came up.

Paying his tributes to the late V K Krishna Menon, he said Mr Krishnan Menon was a fiery proponent of self-reliance and an enthusiast of indigenous expertise.

CSO: 5100/7035

NO DECISION YET ON ENRICHED URANIUM SUBSTITUTE

New Delhi PATRIOT in English 11 Dec 81 p 5

[Text] Prime Minister Indira Gandhi informed the Rajya Sabha on Thursday that a decision on production of the mixture of plutonium and natural uranium (MOAX) as a substitute for enriched uranium will be taken at the appropriate time, reports PTI.

The development work on the production of MOAX fuel had already been carried out, she explained.

The Prime Minister said the Government has taken up a three-pronged programme to increase the availability of uranium in uranium in the country.

The programme, she said, included further intensification of exploration efforts to discover fresh deposits of atomic minerals hastening of the sub-surface examination of promising uranium occurrences and strengthening of the instrumentation and analytical facilities to back up exploration efforts.

Mrs Gandhi listed the important steps to develop indigenous nuclear technology to achieve self-sufficiency in the atomic field.

These include developments of manpower and competence to manufacture nuclear equipment, heavy water and fuel and to develop processes such as waste management and the application of isotopes.

For manpower development, the Department of Atomic Energy had its own training arrangements for different levels of staff.

The competence to manufacture fuel and heavy water and in the other processes was developed in facilities owned by the Department itself, while full encouragement was given to Indian public and private industries to develop competence to fabricate nuclear equipment, Mrs Gandhi said.

CSO: 5100/7038

TARAPUR WASTE IMMOBILIZATION PLANT TO OPEN

Bombay THE TIMES OF INDIA in English 10 Dec 81 p 5

[Article by S. Kumar]

[Text] BOMBAY, December 9.

THE world's second commercial plant for immobilisation of the high-level radioactive waste will be commissioned shortly at Tarapur. The first such plant at Marcoule in France became operational in 1979.

A team of International Atomic Energy Agency experts who reviewed India's progress in the handling techniques and storage of high-level radioactive waste at a three-day meeting here today concluded that in terms of worldwide technology, India's achievement is an important landmark. India has established that in the present status of know-how, it is possible to condition high-level radioactive waste for long-term storage, according to the experts.

The chairman of the IAEA technical committee, Dr. D. W.Clelland, a representative of British Nuclear Fuels Limited, describing the Tarapur waste immobilisation plant as a milestone in the technology of vitrification and storage of high-level radioactive waste, told The Times of India that the confidence of the nuclear industry, would be strengthened following this breakthrough. This is the first significant step towards protection of the environment from the harmful effects of radioactivity which has led the anti-nuclear lobby to question the safe harnessing of nuclear power.

The IAEA experts from the U.K., the U.S., West Germany, France, Canada, Belgium and Japan will visit the plant at Tarapur tomorrow.

High-level radioactive wastes are generated when spent fuel from the reactors are reprocessed to recover plutonium and the enburnt uranium.

The wastes contain more than 99 per cent of the total radioactivity in the entire nuclear fuel cycle. These radioactive elements have to be suitably conditioned and contained to ensure their isolation from human environment for at least several hundreds of years and more.

The waste immobilisation plant will convert the wastes into a glassy form. The wastes will be incorporated in a stable and inert borosilicate solid matrix. The plant aims at irretrievable immobilisation of wastes. The conditioned and solidified products are then cast in high integrity stainless steel canisters and after sealing and intensive remote inspection and testing, they are emplaced in a secondary canister. The seal-welded canisters are the final units meant for storage and disposal.

The solidified wastes are to be provided cooled storage at the site for 20 or 30 years. The period is required to dissipate the heat generated by the waste due to decay of the radioactive nuclides and later, their transportation will be rendered easier, safer and relatively economical.

INDIGENOUS DESIGN

The air coolant system, as the plant itself, is based on indigenous design. Natural circulation of air is used to cool the storage unit.

Investigations on the long-term characteristics of the solidified wastes under realistic disposal conditions are being studied and India is one of the very few countries in the world to take up such full-scale radioactive studies.

In the final step, a permanent repository will have to be found for ultimate disposal of the conditioned wastes. As in some of the developed nations, India is working on the selection of a suitable geological formation for locating such a repository. While, other countries are investigating salt, clay, shale and granite formations. India is at present evaluating a few sites in the granitic-gneiss formations in the peninsular shield, comprising the western ghats and South India.

In France, it has been calculated that all high-level wastes produced between 1974 and 2000 (20 nuclear power reactors were operating in 1980) will, in solid form, make up no more than the volume of one Olympic-size swimming pool. A 1,000 Mw nuclear power plant and its associated fuel cycle facilities generate about two cubic metres of solidified high-level radioactive wastes per year.

The vitrified waste glasses are very stable with good resistance to heat, chemical action, radiation and mechanical stress. Even in flowing warm water (40 degree Celsius) it would take 100 years to dissolve away about 1 mm of the surface of such a glass.

Though the rate of generation of such wastes in India is rather small at present, it is likely to increase substantially with our commitment to reprocess spent fuel and recycle fissile material.

CSO: 5100/7036

BRIEFS

URANIUM IN KURNOOL--Kurnool, Dec. 9 (UNI)--Atomic energy expertsc have found uranium deposits in A m kur taluk in Kurnool district of Andhra Pradesh and sent them for analysis, according to district collector T Munira nam. He said gold deposits were also found in Dhone and Banganapalli taluks. [New Delhi PATRIOT in English 10 Dec 81 p 7]

CSO: 5100/7037

MUSLIM COUNTRIES NEED TO DEVELOP NUCLEAR WEAPONS

Karachi JANG in Urdu 6 Dec 81 p 3

[Editorial: "How Long This Apologetic Attitude?"]

[Text] The great tragedy of the present age is that aggressive expansionist and rascist countries have the atomic bomb, or the capability to build the atomic bomb, while those countries who are against expansionism, and who respect the boundaries of their neighboring countries do not even have the arms necessary for their real defense needs. South Africa and Israel are included among the expansionist and rascist countries. Similarly, India has been involved in aggression against Pakistan and in breaking it into two parts. She has also usurped the right of self determination of the Kashmiri people. Both the aforementioned countries have the atomic bomb, while India has already acquired the capacity to build the atomic bomb. India also has ambitions and plans to build atomic weapons. In the Upper House of Parliament, the Rajya Sabha, the Indian Prime Minister Indira Gandhi thus made it clear that her government understands the importance of a program of atomic energy and is making no reduction in it. No doubt the Indian Prime Minister has been claiming that their atomic energy program is for peaceful purposes, but the truth is that India is engaged in rapidly putting into practice its secret plans for atomic weapons. This is why India is not prepared to open her nuclear centers to international inspection nor to sign any international or mutual treaty for stopping the spread of nuclear weapons. India has not cooperated in implementing the Pakistani suggestion to establish this area as a nuclear free zone, nor has she given any assurance which could be internationally accepted that she will not build nuclear weapons. On the basis of these facts we say that the day is not far off when the atomic bomb will be included in the Indian arsenal.

The attitude of Israel, on the other hand, is even more serious than that of India. Israel already has more than one atomic bomb. She has developed the capability to use these bombs herself and at the same time she does not want to see any muslim country have the capability to test an atomic bomb. Thus Israel attacked and destroyed the Iraqi nuclear center. We are now confronted with the threat that the next target of the Israelis will be Pakistan's atomic reactor. This is the attitude of these expansionist countries, and the conduct of America and Russia, who are the greatest nuclear powers in the world, is no different. One power is directly involved in aggression in Afghanistan and the other power is providing assistance and protection to Israeli aggression.

In contrast to the attitude of the expansionist countries, the attitude of the Muslim countries, including Pakistan, is completely apologetic. They have been continually insisting that they have no intention of building atomic weapons. Muslim countries have not given as much attention to nuclear technology, brought into action the amount of material resources, or given the importance to mutual cooperation which they should have. That the aggressive and expansionist powers should continue to develop atomic weapons capabilities and the Muslim countries remain backward in the field of nuclear technology is a cause for great concern. It is essential that Muslim countries bring this matter under consideration at the highest level. They should form a program for progesss in nuclear technology, bring together their material, scientific and technical capabilities in order to implement it, and abandon this apologetic practice of saying "we will not build an atomic bomb." Instead the Muslim countries should give warning to all the aggressive powers that if they have produced atomic weapons or borrowed them from some patron nuclear power in order to maintain their expansionist and offensive powers, then the Muslim countries will not refrain from doing so also. In view of the fact that Pakistan and the Arab and Muslim countries of the Middle East are at this time confronted with aggressive and expansionist powers which have nuclear weapons whenever they might be needed. When the aggressive powers who are their enemies have already done so, why should they not do the same? It is time for us to abandon our apologetic attitude.

Various witnesses and circumstances have made it clear that the aggressive and expansionist enemies of the Muslims are preparing to develop nuclear weapons, that some already have this capability, and that they want to remain in possession of Muslim lands through the threat of the use of nuclear weapons and to take over additional Muslim areas or to make them weak by breaking them into pieces. This state of affairs is a great challenge for the Muslim nations. They can answer this challenge only by mutual cooperation in making progress in nuclear technology. So far as Pakistan and the dangers it is faced with are concerned, they require that Pakistan make progress in the field of nuclear technology at any cost and complete its plans without being pressured or influenced by anyone. Other friendly Muslim countries should give every possible assistance and cooperation in this effort. The authorities are very well aware of what the Pakistani people want in the defensive and nuclear field and what their goal is. We hope that they will fully respect the courage and determination of the Pakistani people and not allow themselves to in any way become weak in obtaining the desired goal. The people of Pakistan are ready to make the greatest of sacrifices for this goal.

9914
CSO: 5100/4510

PAKISTAN'S EFFORTS TO GAIN MISSILE LAUNCH TECHNOLOGY OUTLINED

Bangkok BANGKOK POST in English 5 Dec 81 p 8

[Article by Radhakrishna Rao]

[Text] **PAKISTAN appears to be making all-out attempts to acquire launch vehicle technology — so far mastered by only seven countries in the world — as a first step towards building its own missile delivery system.**

This news, on top of the indications that the so-called Islamic bomb assembled in Pakistan will be detonated late this year or early next, speaks volumes for Pakistan's flair for securing classified technology in James Bond style.

Pakistan has been spurred on by the fact that India joined the prestigious space club as its seventh member last July when its launch vehicle SLV-3 successfully orbited a 40-kg Indian experimental satellite.

Pakistan had started betraying signs of fear over the possibility that India could convert the launcher into a strategic missile. In popular imagination rocket launching has come to be associated with missile testing.

According to a recent issue of the West German magazine *Stern*, Pakistan is trying to do a deal with the controversial German aerospace firm Otrag to acquire rocket technology to develop launch vehicle and nuclear delivery systems.

Otrag is believed to have agreed to build a facility to test and develop space systems in Pakistan, though a firm deal is yet to materialise.

Israeli intelligence sources say that in May 1979 Pakistan signed an agreement with Otrag's subsidiary, Otrag Holding International, in Panama for rocket technology.

The deal was considered at that stage to be optional. It carried the signatures of Otrag's rocket expert Lutz Kyser and its executive chief Klause Peter Nipkel.

Pakistan's foreign exchange kitty was then low, but it has now started bulging and Otrag is confident of a final deal at any moment.

A BBC investigation team has found that Saudi Arabia will help with the cost. Two Saudi representatives have had talks with the Otrag management in Frankfurt about the feasibility of building and installing a variety of nuclear delivery systems in various parts of West Asia. Secret Otrag operations at a well-guarded site in Syria may portend West Asia's anxiety to join the missile race.

It is an open secret that in 1980 Otrag made an agreement with Libya in Zurich to provide a complete missile system — medium and long range — capable of taking heavy warheads to a destination 7,000 km away. Libyan Head of State Col Gadhafi is said to have funded Otrag to the tune of US$ 1.5 billion.

Pakistan has neither the industrial base nor an indigenous space programme capable of building a launch vehicle or a nuclear delivery system on its own. It embarked on a space programme way back in 1961 — two years before India set up a rocket launching station at Thumba, near Trivandrum — but the space programme has not moved beyond firing "Rehbar" sounding rockets for atmospheric investigation and scientific studies from a launch pad 50 km from Karachi. Till now, Pakistan has launched 150 sounding rockets to between 20 km and 40 km.

A recent Pakistani announcement about the formation of the Space and Upper Atmospheric Research Commission (SUPARCO) for the "promotion of space and upper atmospheric research" has more to it than meets the eye.

SUPARCO will be headed by President Zia ul-Haq. Radio Pakistan quoted the chairman of Pakistan's Atmospheric Research Council (ARC) that "Pakistan is giving final touches to a long-term programme for exploration and peaceful uses of outer space."

Otrag was formed by an enterprising group of Frankfurt engineers, with support from a string of leading West German arms dealers and encouragement from South Africa.

It has passed from one crisis to another since it was formed in 1974. It secured a launch pad spread over 250,000 sq km in the equatorial bush of Zaire, but soon found itself in the middle of controversy.

Soviet propaganda against "the military, political and hegemonistic ambitions of Nazi-led Otrag in the Africa heartland" created revulsion against the firm in a major part of Africa heartland" created revulsion against the firm in a major part of Africa. The "Nazi" tag is presumably because of Dr Kurt Dabus' presence in Otrag's top echelons.

Dr Dabus worked for the space pioneer Warner Von Braun in developing the V-2 rockets that were directed at London in the last days of World War II.

Otrag has been running a high-voltage campaign to sell its so-called "cut price missile in Third World countries that can build satellites but cannot launch them." It claims it can launch a satellite for half the amount charged by America's reusable Space Shuttle sent on a successful orbital test last April.

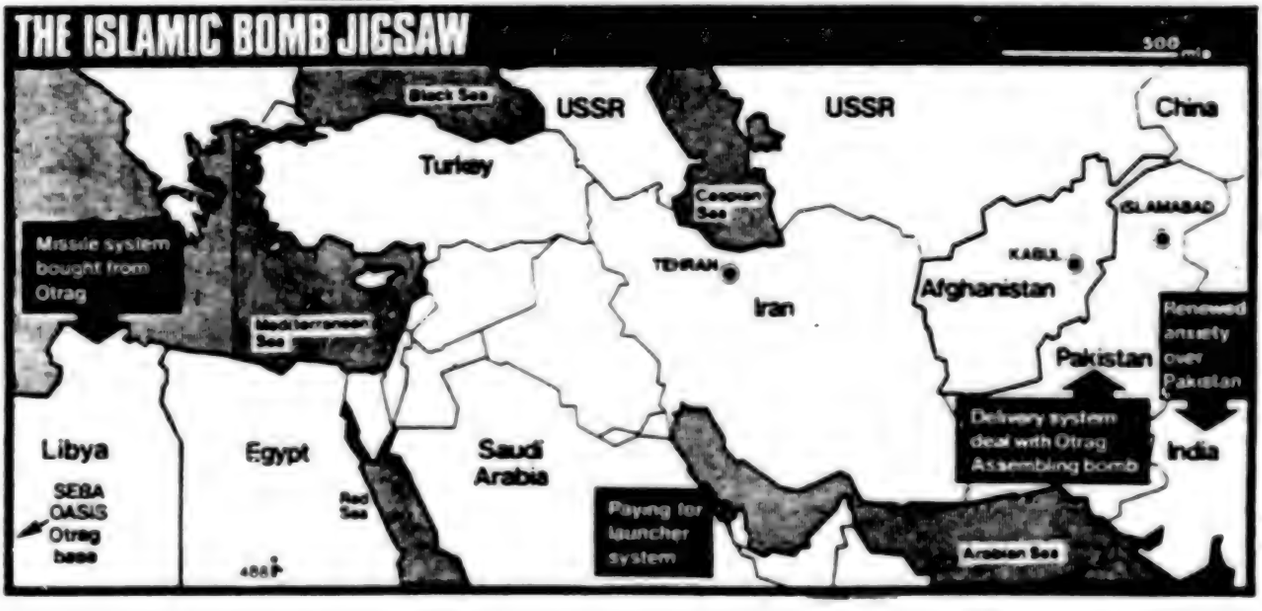
Of the three rockets Otrag launched from its Zaire base, two are known to have flopped. Before the fourth was fired in the summer of 1979, President Mobutu Sese Seko ordered Otrag out of Zaire. For a year after that it was without a base for rocket flights.

In mid-1980 Otrag made a deal with Libya for a launch base on a desert strip, near the Seba Oasis, about 800 km south of Tripoli.

It claims to have successfully flight-tested a sub-orbital rocket — first from the Libyan range — on March 1. Details of the type of rocket are not known, but Otrag says it can now push the "commercial marketing of the launch system actively on a world-wide scale."

By early next year Otrag plans to send its rocket on an orbital mission with a satellite payload. On this reckoning, Otrag hopes to build a launcher powerful enough to hurl communication satellites into geostationary orbit — 36,000 km above the equator where the satellite appears to be stationary — in 1983.

But even in Libya, Otrag is finding things far from easy. The Government of Morocco, which is at loggerheads with Libya over support to the Polisario movement in mineral-rich Western Sahara, has launched a vigorous campaign against Otrag operations in Libya.



CSO: 5100/4513

COOPERATIVE DEVELOPMENT OF TOKAMAK REACTOR DESCRIBED

Poznan GAZETA POZNANSKA in Polish 16 Nov 81 p 3

[Interview with Yevgeniy Velikhov by Siergiej Kulinicz: "To Light Artificial Suns--An APN [NOVOSTI PRESS AGENCY] Special for GAZETA POZNANSKA"; date and place not given]

> [Text] For short, physicists call it KRT [controlled nuclear reaction]. The idea originated 30 years ago in the Soviet Union and very quickly assumed a prominent place in the scientific programs of many countries.

Let us compare: a gram of uranium atoms split in a nuclear reaction generates 20 million kilocalories of heat, but the synthesis of deuterium and tritium nuclei (isotopes of hydrogen) generates 80 million kilocalories of heat per gram of fusing substance. From this, one obtains the staggering calculations according to which a glass of ordinary water is equivalent to a ton of crude oil with regard to energy content.

Thus it makes sense to strive for a power industry for which nature prepared an inexhastible source of fuel--the oceans. In addition, the extraction of crude oil and natural gas is becoming increasingly more expensive, and the amount of uranium resources available is not as abundant. Thus the future belongs to thermonuclear "electric factories."

Not too long ago the latest technical developments in KRT were examined at the All-Union Conference on Thermonuclear Reactor Engineering Problems which was held in Leningrad and organized by the USSR State Committee on the Use of Atomic Energy. The conference was attended by 300 specialists from 50 Soviet scientific centers. Guests from Bulgaria, Czechoslovakia, Japan, Yugoslavia, the GDR, Poland, the FRG, Romania, the United States, Hungary and Great Britain participated in the work of the conference.

[Question] What is KRT and what problems does it present to the scientific community? These questions were answered by Yevgeniy Velikhov, vice chairman and member of the USSR Academy of Sciences.

[Answer] The idea of KRT was "suggested" by the sun. The question as to 'why the sun shines' leads us to the basic physics problem of plasma. At a temperature of 20-30 million degrees, electrons are stripped from their atoms. The mixture of free electrons and newly created ions constitute a plasma. Within the sun's interior, nuclei of deuterium and tritium collide and new elements fuse into the nuclei causing a thermonuclear reaction during which a tremendous amount of energy is released.

Scientists resolved to re-create the solar process. It appears that it is only necessary to heat up a certain amount of plasma to a very high temperature and maintain it in a state of compactness till the synthesis reaction occurs in it. However, many years of research showed that under conditions here on earth the reaction requires a temperature five times greater than the 20 million degrees of the sun's interior, and the amount of energy liberated by a KRT also depends on plasma density. In the interior of the stars, densities are thousands of times greater than the density of a solid. Thus the problem arose as to how to achieve the necessary plasma temperature and density.

In addition, the plasma particles, moving about in a random manner at tremendous speeds, are contained on the sun by the force of gravity. On earth this force is very small, and plasma particles moving about in a closed space collide with the chamber walls and waste energy. As a result, the plasma cools off. How can the plasma be maintained in order to initiate a KRT? These are problems of science and technology.

[Question] Lately one hears much about TOKAMAKs....

[Answer] In the opinion of scientists the TOKAMAK is the most promising design. In this equipment, a plasma is generated, heated and maintained as if in suspension with the aid of a strong magnetic field.

The TOKAMAK was designed at the I.V. Kurchatov Atomic Energy Institute. Currently, over 50 TOKAMAKs are in operation worldwide. Their superb results with regard to the thermal parameters of the plasma, its density and the maintenance time achieved in the USSR with the TOKAMAK-10, the largest one in the world, has enabled work to proceed to the next stage in the KRT field.

With TOKAMAK-15, now under construction in Moscow, scientists hope to obtain a plasma having thermonuclear parameters and to demonstrate the physical possibility of realizing a KRT under controlled conditions. Another goal is to investigate in detail all the physical processes of the synthesis reaction, including the mechanisms of its origin, and to resolve such technological tasks as selecting and investigating structural materials, and designating tasks to avoid plasma contamination.

[Question] Many studies were presented at the conference concerning designs and various systems of a thermonuclear reactor. What are the main engineering problems?

[Answer] Here one must start with certain characteristics of the TOKAMAK-15. Its plasma will be heated to 70-80 million degrees and the magnetic field will be generated by superconducting coils. As is known, superconductors operate

only in a liquid helium environment, that is at -269° C. Thus, in addition to multiton mechanical loads, the system's units will be subjected to immense swings in temperature. For these reasons, thermonuclear equipment should be reliable, long-lived and economical. Thus the creation of materials that are especially strong and durable is awaited.

The uninterrupted and precise operation of all systems depends on the resolution of many significant problems, for example, the superconductor problem. To conduct thousands of amperes of current, solid conductors having cross-sections of 10-12 cm would be required. But these can be easily replaced by a superconducting cable having the diameter of an ordinary ring. Such a cable consists of 10-15 twisted wires, each one of which is braided from hundreds of niobium-titanium threads that are thinner than a hair. Imagine the scale and precision of work.

The optimal method of preparing and recycling the fuel--a mixture of deuterium and tritium, and a method for heating and purifying plasmas must be determined. Also, a reliable system to automatically control and check equipment parameters needs to be designed.

[Question] At the conference, specialists from the socialist countries spoke about work being conducted jointly with their Soviet colleagues. What areas of work does this collaboration encompass?

[Answer] Specialists from Czechoslovakia, the GDR and Hungary are participating in research being conducted on TOKAMAK-10. In their own countries, Hungarian physicists are investigating various physical processes of synthesis, GDR physicists are investigating the nature of the reciprocal reaction of plasma and chamber wall, and Czechoslovak physicists are investigating problems relating to diagnosing and heating plasma by high-frequency currents. Our Polish colleagues have achieved excellent results in laser research and in other fields.

This collaboration is very important in work concerning KRT. For the TOKAMAK-10, the GDR specialists produced the diagnostic station and optical system for the Delfin equipment at the Institute of Physics of the USSR Academy of Sciences. The Hungarians developed an automated control system for the TOKAMAK-7 cryogenics. Magnetic superconducting systems have been used in its design for the first time.

TOKAMAK-15, now under construction, will also be a joint project to a certain extent. The Hungarians will produce the automated data gathering and processing system, the magnetic field powering system and the plasma heating system. The GDR is developing equipment to investigate contaminants in the boundary later of a plasma. The Bulgarians and Czechoslavaks will participate in the production of several assemblies.

[Question] What is the status of the Soviet proposal to create a large international TOKAMAK that was accepted by the International Atomic Energy Agency?

[Answer] The design work for the INTOR TOKAMAK is quite advanced. For example, its general layout from the viewpoint of assembly and the remote servicing of the highly radioactive sectors has been established.

The project will be completed during the 1982-1983 period. Then the day will come when the artificial sun will provide us with energy.

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CSO: 5100

USE OF HUNGARIAN-MADE SWITCHGEAR IN NUCLEAR POWER PLANTS

Budapest VILLAMOSSAG in Hungarian Vol 29, No 7, Jul 81 pp 193-198

[Article by Kara, ANTAL, Dr, graduate electrical engineer, candidate of technical sciences, deputy director of Electric Power Plant Designing and Installation Enterprise (VERTESZ)]

[Summary] Conventional switchgear made in Hungary for conventional power plants had to be redesigned and new switchgear had to be developed for use in the Hungarian nuclear power plant under construction. The redesign and development was made with the newly promulgated Hungarian Standard MSZ-1570 in mind. A high-voltage switching unit for the 400/120 kV substation features units with silicon hexafluoride in the 400 kV section. The new Type 12 BOTO capsulated switching system is suitable for use in power plants, industrial factories, and distribution systems. It operates at the 10 kV voltage level. The Type P low-voltage switchgear family was redesigned for use in nuclear power plants. Soviet-made switches are installed in the Type R low-voltage switching systems. Cabling systems for nuclear power plants must meet very stringent requirements; they must be installed in corrosion-resistant ducts. These ducts were specially designed for this use by ALUTERV [Aluminum-Industry Designing Enterprise] and FKI [Physics Research Institute]. The first block of the new nuclear power plant requires approximately 1600 km ductwork. A new aluminum-capsulated bus was developed by the Hodmezovasarhely factory of the Hungarian Aluminum-Industry Trust and the VEIKI [Electric Power Industry Research Institute] to connect the generator and the primary transformer. Although most of the equipment for the first Hungarian nuclear power plant is imported, it is evident that the Hungarian electrical industry can, and does, produce part of the required switchgear. This industry will be even more equipped to supply equipment for nuclear power plants in the future. Photo captions: (1) Control station of the 400/120 kV substation of the nuclear power plant in Paks; (2) The Type 12 BOTO switching system; (3) Type 0.6 P switching system; (4) Type 0.6 R switching system being installed; (5) Type 0.6 R switching system

in the shop, ready for delivery; (6) Type PASZ-TKT capsulated cable duct system with open door for Paks nuclear power plant; (7) Fully enclosed PASZ-TKC cable duct in Paks nuclear power Plant; (8) Aluminum-capsulated bus at Paks Nuclear Power Plant to connect the generator and the primary transformer. Figures 8, 3 Hungarian references.

2542
CSO: 5100/3004

BRAZIL, FRG MAY SUPPORT MEXICAN NUCLEAR PROGRAM

Rio de Janeiro JORNAL DO BRASIL in Portuguese 6 Dec 81 p 48

[Article by Laercio Silva]

[Text] Brasilia--Nuclear sector sources revealed in Brasilia that Brazil and Germany may participate in a broad nuclear agreement with Mexico. A group of emissaries from the Mexican Government came to Brazil recently in a chartered jet to assess the capacity of the Brazilian Nuclear Corporation (NUCLEBRAS) to supply reactor components and other nuclear materials and services. According to the reports, they returned quite impressed.

The Kraftwerk Union (KWU) is participating with NUCLEBRAS in competitive bidding to be judged by the Mexican Government on 1 February 1982 for the initial supplying of two nuclear plants of 1,200 megawatts each. But in addition to those two, the Mexican Government is aiming at an initial nuclear program of 15,000 MW and is demanding a broad transfer of technology.

Who Is Participating

Participating in the competitive bidding, in addition to KWU, is Asea Atomic of Sweden, Framatome of France, Atomic Energy of Canada and the U.S. companies General Electric, Westinghouse Electric Corp, and Combustion Engineering.

The Americans were originally in a very good position to supply the two 1,200 MW units but they lost ground after the Mexican Government decided to demand a broad transfer of nuclear technology, including uranium enrichment technology, according to the specialized American weekly, NUCLEONICS WEEK, in its edition of 5 November.

At a meeting with representatives of the seven bidders, the Mexicans explained that without the guarantee of the transfer of technology, apparently attempting to duplicate what Brazil obtained when it signed the nuclear cooperation agreement with Germany, the bidder will not have any chance. Basically, they demand the transfer of technology of the whole nuclear fuel cycle and they are not specifically exempting uranium enrichment.

Good Chances

Principally due to the demand for the transfer of enrichment technology, KWU-NUCLEBRAS are the bidders with the best chances because the latter, together with

another German company, Steag, holds the rights to the jet nozzle enrichment process technology. They actually founded a specific company to market the process with third countries, NUSTEP [presumably NUCLEBRAS-STEAG], with headquarters in Germany, the capital of which is 50 percent NUCLEBRAS' and 50 percent STEAG's.

The involvement of NUCLEBRAS in the negotiations with Mexico is inevitable not only due to the possibility of the transfer of the nozzle technology but also by virtue of the stockholders agreement of the NUCLEBRAS Engineering Corporation (NUCLEN), NUCLEBRAS' engineering subsidiary, in which the KWU participates with 25 percent of the capital. According to the agreement, KWU is committed to consulting with NUCLEBRAS in any bidding or supplying of nuclear materials and services in which KWU participates in Latin America, establishing a reserved share of the market in the continent for NUCLEBRAS and its subsidiaries.

An example of the observance of the stockholders agreement was the participation of the NUCLEBRAS Heavy Equipment Corporation (NUCLEP) in supplying the components of the reactor vessel of the Atucha-2 nuclear plant, which KWU is supplying to Argentina. In the event that KWU wins the bid in Mexico, NUCLEP will be the builder of a large part of the heavy components of the two initial plants and eventually others because KWU does not build that equipment but generally orders it from the GHH Company of Germany and Voest-Alphine of Austria.

Mexican Program

In addition to the broad program which it proposes to initiate now, Mexico has already been building two nuclear plants since 1973 which should go into definite operation next year. The supplier is General Electric and the plants are of the Boiling Water Reactor (BWR) type, similar to the Pressurized Water Reactor (PWR) adopted by Brazil but without pressurization of the water used to cool the nucleus. The Laguna Verde-1 and 2 in the state of Vera Cruz have a net electric power of 654 megawatts each.

It is reported that the Mexican authorities have reached the conclusion that they should opt for the PWR system, which is safer and has less technological problems. If that should occur, General Electric is definitely out of the bidding because it only has BWR technology capability.

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BRAZIL TO AID FRG IN EXPORTING NUCLEAR TECHNOLOGY

Rio de Janeiro O GLOBO in Portuguese 3 Dec 81 p 23

[Article by Celia de Nadai: "Brazil Helps Germany Export Nuclear Technology"]

[Text] Bonn---The difficulty West Germany is having in exporting nuclear technology to countries of the Third World is being resolved with the support of Brazil, which has signed agreements with Latin American and Middle East countries. The expectation is that Brazil will transfer the first phase of technology, the most difficult to assimilate to those countries, leaving arrangements for the last phases of operation of nuclear powerplants to the Germans.

The information was provided yesterday by the international director of the Juelich Nuclear Research Center, Dieter Nentwich, who revealed the difficulties being faced by the center in exporting nuclear technology, one of its main activities. According to him, West Germany has had many difficulties in opening new markets interested in the installation of nuclear powerplants because in addition to the countries having to assimilate that technology, they have to have the resources for developing it in a continuous manner.

Intermediary

It is in that phase that Brazil is serving as an intermediary. The Germans have attributed great importance to technological cooperation with Brazil, which is the country with which they have the largest number of agreements and exchanges of researchers and scientists. Other than Brazil, the only Latin American country which has maintained significant contacts with the Germans is Mexico, but only in the training of researchers.

The idea that Brazil serve as an intermediary between West Germany and the countries of the Third World is not revealed openly. The director of Juelich said that there is no signed agreement with Brazil in that respect but admitted: "The idea is that West Germany can use markets opened by Brazil." According to him there is no need for official papers because "that is a game which is being adapted without prior agreements."

Actually that expectation has been taken very seriously by the Germans. From 1977 to the present, West Germany has received 77 missions of Brazilian technicians, a total of 560 persons. This year alone, nearly 30 Brazilian technicians have already been working on programs for the transfer of technology.

Brazil is the only country with which Germany maintains an integral cooperation in the nuclear technology area. In addition to specific projects and training of scientists, it has a complete program devoted to the installation of nuclear powerplants.

Uranium Exports

The director of the international department of Juelich is in favor of Brazil exporting unprocessed or enriched uranium. In his opinion it was "very sensible" for the Brazilian Government to say on the occasion of the much debated clandestine exports of uranium to Iraq that it was willing to sell the raw material to anyone, providing they respected the requirements of international standards.

He said only that Brazil will be in a position to ask for a higher price when it is in a position to export enriched uranium. That would also be a good business for the Germans as the Brazilian exports of enriched uranium will need installations only Germany is in a condition to sell Third World countries.

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CSO: 5100/2058

NUCLEAR FUEL CONTAINERS TO BE BUILT IN 1982

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Dec 81 p 28

[Text] Next year Brazil will begin to make the containers that will serve for the transportation of uranium oxide pellets (atomic fuel) to be used in the reactors of Brazilian nuclear powerplants. Those containers will be built by the Fuel Element Factory (FEC) located in Resende, Rio de Janeiro State.

The FEC contracted the Brazilian Institute of Nuclear Quality (IBQN) to inspect the production of 368 containers to be used for the transportation of nuclear fuel. The institute explained that the transportation and handling of uranium, like that of any other radioactive material, is controlled by international safeguard systems adopted by almost all countries, including Brazil.

The contract signed between the FEC and the IBQN, said the institute, stipulates the supervision and production of the containers in the most minute detail, from the identification of the raw material to be used in their construction to the final inspection of the product.

Brazil is preparing to learn all the phases of the fuel cycle. In the municipality of Resende, an industrial complex is being installed consisting of three units of the cycle: a conversion unit which will convert uranium concentrate into uranium hexafluoride, an enrichment plant, which will use the jet nozzle system, and a fuel element plant. The conversion plant is of a size to produce 500 tons of uranium content at first, with the initiation of operations scheduled for 1983.

It will be at least another 5 years before the country can produce enriched uranium, although technicians and scientists of the nuclear sector understand that it will only be possible if the viability of the jet nozzle process on an industrial scale is confirmed at the latter part of the century. According to the NUCLEBRAS [Brazilian Nuclear Corporations] timetables, the enrichment plant will be operated by a subsidiary of NUCLEBRAS, NUCLEI (NUCLEBRAS Isotope Enrichment, Inc], and it will have its first cascade installed in 1983, followed by the commercial unit in 1986.

FURNAS, responsible for the operation of Angra I now, and Angra II and III in the future, requested the IBQN to proceed with the prequalification process for the firms which will provide repair services for the motors of the Angra I powerplant. The institute is an independent technical supervision agency whose purpose is the verification of the quality of products and services used in nuclear installations.

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CSO: 5100/2058

ANGRA I POWER NOT NEEDED, WILL NOT GO ON LINE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 11 Dec 81 p 25

[Text] The Angra I nuclear powerplant cost the country $1.4 billion and after it is ready is not going into commercial operation that soon. The president of FURNAS (Brazilian Powerplants), Licinio Seabra, who yesterday called a press conference to speak on the subject, said: "There is no longer a date for placing the power generated by the reactor into the power system."

Seabra said the national power system has a surplus of almost a million kilowatts and for that reason there is no need to place more generating power in commercial production. As long as that situation lasts, explains the president of FURNAS, the powerplant is going to operate in a test mode "for the assimilation of technology, waiting for the market to react."

Licinio Seabra would not comment on what such assimilation of technology would cost, saying that it would be a cost the country will have to pay and FURNAS will do everything possible to minimize it. He would not comment on the fact that Angra I will be the first nuclear powerplant to operate only for the assimilation of technology, since apprenticeship and assimilation of technology are generally done in laboratories and even in simulators which completely simulate a nuclear powerplant at much less cost.

The interview with the president of FURNAS was convoked mainly to deny reports that the reactor of Angra I was about to go into commercial operation, placing the country in the nuclear age. Licinio Seabra declared: "There is nothing new and it was never said that Angra I would go into operation in December. We have a work timetable without commitments to any date, only to safety."

According to Licinio Seabra, this is a circumstantial period with an excess of electric power in the system. Therefore, the nuclear powerplant is going to operate with a minimum load of from 30 to 40 percent of its power, only in a test mode for the assimilation of technology. "Next year we shall have no other power source entering the FURNAS system and if hydrological conditions or those of the market warrant it, the situation could change," says Seabra.

The FURNAS budget for Angra I next year foresees expenditures of 15 billion cruzeiros for the complementation of construction, research and other expenses, it was explained by Seabra. According to him, any power generating source has to have a certain period for completion and no one in 1979 could foresee the economic recession. Two years ago the specter of power rationing was the great threat. However, Licinio expects a renewal of economic development which will bring a resurgence of the demand for power.

The president of FURNAS also said that the costs of nuclear fuel do not exceed 5 percent of the final cost of the project, stating also that the cost of fuel per kilowatt hour is $.006. In summary, Angra I is going to operate in a test mode only, with as many stoppages of the reactor core as necessary, with output reduced to the minimum load, uneconomical in commercial terms, only justifying the operational levels for "the assimilation of technology."

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CSO: 5100/2058

YELLOW CAKE PLANT BEGINS PRODUCTION IN MINAS GERAIS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Dec 81 p 24

[Text] For the first time Brazil produced uranium on an industrial scale at the plant of the municipality of Caldas in Minas Gerais. In its industrial complex of the Pocos de Caldas Plateau, to be inaugurated during the first half of 1982, NUCLEBRAS [Brazilian Nuclear Corporations] obtained a production of 200 kilos of yellow cake [uranium concentrate] the day before yesterday and 300 kilos yesterday from ore extracted from the Osamu Utsumi Mine in Caldas. Production tests began on 2 December.

The uranium concentrate production plant, a part of the Pocos de Caldas industrial complex, has a nominal production capacity of 500 tons of yellow cake per year. Preoperational tests are now going on and will last approximately 3 months, followed by industrial production. Some production is being obtained in the preoperational phase.

Geological reserves of uranium of the plateau are now 26,800 tons, of which 20,000 are measured and 6,800 tons are estimated. Ninety percent of the equipment for the industrial complex of the Pocos de Caldas Plateau was supplied by national industry. The remaining 10 percent refers to very special equipment and instruments which are not yet manufactured in the country, according to NUCLEBRAS.

The basic plan of the plant was made by a French group, the Societe du Cicle de L'Uranium Pechiney Ugine Kuhlman, and developed pursuant to a process of recovery of uranium obtained by NUCLEBRAS technicians in the area of mineral energy. The Andrade Gutierrez construction company did the work of removing the layers of earth from the deposit and the preliminary work on it. NATRON [expansion unknown] did the plant detail engineering work, the Paulo Abib Company did the detail engineering work of the mine; the Tenenge did the installation, and the Logos-Engerio Consortium was responsible for managing the enterprise.

The industrial complex of the Pocos de Caldas Plateau includes the uranium mine, which is already in operation, the concentrate production plant, which is in preoperational tests and the sulphuric acid plant and auxiliary installations. NATRON planned the sulphuric acid plant with its own technology. Sulphuric acid is the raw material used to make uranium ore soluble.

According to NUCLEBRAS, up to now nearly $230 million have been spent on the Pocos de Caldas Plateau industrial complex. Taking into account the present price of uranium, the Pocos de Caldas Plateau industrial complex will sell $1.1 billion during its useful life, not counting the value of the zirconium and molybdenum byproducts.

Ammonium Diuranate

The nuclebras uranium concentrate plant will produce commercial yellow cake in the form of ammonium diuranate. As secondary products it will produce molybdenum concentrates in the form of calcium molybdate in the first phase and zirconium in the form of oxide in the second phase.

Ammonium diuranate, a yellow powder, is a uranium concentrate from which is produced the fuel for nuclear reactors in a subsequent phase. To obtain yellow cake, uranium ore is crushed, ground and dissolved in sulphuric acid. A paste is formed, which when treated with chemical reagents precipitates the uranium combined with ammonia, obtaining ammonium diuranate.

Brazil's uranium reserves, according to NUCLEBRAS, are now 236,300 tons, the fifth largest in the world, exceeded only by those of the United States, Canada, Australia and South Africa (including the reserves of Namibia). The largest Brazilian deposit is that of Itatiaia in Ceara, with about 122,500 tons, followed by those of Lagoa Real in Bahia with 48,000 tons. The third in size is that of the Pocos de Caldas Plateau. The rest are as follows: the iron-bearing quadrilateral area of Minas Gerais, 15,000 tons; Espinharas, Paraiaba, 10,000 tons; Figueira, Parana, 8,000 tons; Amorinopolis, Goias, 5,000 tons and Campos Belos-Rio Preto, Goias, 1,000 tons.

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CSO: 5100/2058

FOUR PLANTS TO BE BUILT, NEXT ADMINISTRATION TO DECIDE ON OTHER FOUR

Rio de Janeiro JORNAL DO BRASIL in Portuguese 10 Dec 81 p 20

[Article by William Waack]

[Text] Frankfurt--Planning Minister Delfim Neto told German bankers and businessmen yesterday that, for the time being, Brazil will build only four nuclear plants, "necessary to absorb the technology," and that it will leave it up to the next administration--to decide in 1985 about the other four envisaged in the agreement with Germany.

"For the time being, we will stay with Angra-1 and 2 and Iguape (Sao Paulo)-1 and 2," said Delfim, who also announced the acquisition of two more loans of $150 million for the nuclear program. The first is being negotiated and will come to NUCLEBRAS in the beginning of 1982, while the second will be issued in mid-year. The Deutsche and the Dresdner Bank will grant the credits.

Same Question

While announcing the expenditure of $400 million of Brazilian Government funds in the nuclear program next year [1982], Delfim explained the plans regarding the program to the German bankers:

"Four plants are necessary to absorb the technology. The commitment in the agreement calls for eight, but the decision on the other four will not be taken until 1985 by another administration. For the time being, we will stay with Angra-1 and 2 and Iguape-1 and 2, which is sufficient to absorb the technology," said Delfim.

The planning minister gave a general review of the Brazilian economy to the German bankers and businessmen gathered in the auditorium of the Deutsche Bank in Frankfurt, pointing out the fact that the country now has "room to grow" and should achieve a rate of 4 to 5 percent next year.

Paulo Nogueira Batista, the president of NUCLEBRAS, then explained the nuclear program timetable and confirmed Delfim's statements: the Brazilian authorities will not enter the planning phase for the four remaining nuclear power plants until 1986. It will be recalled that Brazil has already contracted for two (in Angra) and has signed a letter of intention for two more (in Iguape, Sao Paulo).

There were no questions regarding the implementation of the nuclear program from the German listeners, most of them bankers. The greatest concern on the part of the Germans was to know when NUCLEBRAS was going to start exporting uranium to Germany, but the timetable of the program or the number of plants did not arouse much curiosity among the Germans.

Delfim had to listen to the same question five times in a row: How is it possible to grow at a rate of 5 percent without balance of payments problems? He replied that he considers that target perfectly feasible and he reminded the Germans that the Carajas and irrigation projects will make it possible to fulfill that target without much problem.

The general attitude of the German bankers was positive. The presidents of Deutsche and the Dresdner banks were not present during the talk but their representatives said that Brazil continues to enjoy credit. Werner Blessing, chairman of the board of the Deutsche Bank declared that the German banking community has confidence in Brazilian administrative capacity and said further that his bank is prepared to continue to finance the nuclear agreement.

Delfim was visibly pleased with the change of attitude that he noted on the part of the German bankers. Only last year, the image of Brazil in the Frankfurt financial market was quite negative, which even led some German banks to exert pressure for Delfim to go to the IMF. The planning minister considers that matter now closed. With a smile of satisfaction, he asked: "Now can it be that they (the bankers) saw who was right?"

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CSO: 5100/2059

BRIEFS

GERMAN URANIUM FOR ANGRA--Brasilia--The first 5.5 tons of enriched uranium acquired by NUCLEBRAS [Brazilian Nuclear Corporations] from URENCO under a contract signed in 1978, will be shipped from Holland to Germany this month, it was revealed yesterday by a Ministry of Mines and Energy source. The first shipment is part of a total of 16.5 tons NUCLEBRAS will use in Germany to manufacture the first reloading for the Angra I nuclear powerplant. Two other shipments of 5.5 tons each will be shipped in February and May 1982, added the source. The fuel pellets to be used for the fuel elements for reloading Angra I will be made under a contract with the German company RBU, Reaktor Brennelment Union, a subsidiary of KWU, Kraftwerk Union, a partner of NUCLEBRAS in the nuclear program. However, the assembly of the fuel elements will be done at the FEC, Fuel Element Factory of NUCLEBRAS in Resende, Rio de Janeiro. NUCLEBRAS signed a contract with URENCO, Uranium Enrichment Company, for a supply of 2 million separative Work Units during a period of 10 years of uranium enrichment. That enrichment was to have been done originally with the uranium to be used in the Angra II and III powerplants. However, the delay in the construction of the two powerplants and the decision by the United States in 1979 not to ship reloadings for Angra I, led NUCLEBRAS to use the first shipments made by URENCO for the fabrication of the first reloading for Angra I. URENCO is a company made up of companies from West Germany, Holland and Great Britain. It has two enrichment plants, one in Almelo, Holland, and another in Capenhurst, England. Each of them has a 200,000 SWU capacity per year and they will be expanding in modular form until they reach a capacity of 1 million SWU per year. A third plant is scheduled for construction in Gronau, Germany. [Text] [Rio de Janeiro JORNAL DO BRASIL in Portuguese 3 Dec 81 p 27] 8908

FRG NUCLEAR PROGRAM COORDINATOR--Hans Stephan Rade, coordinator of the Brazil-Germany nuclear program, said yesterday that the German Government could help technically in the program for the exploitation of Uranium in Itataia, Ceara, if it is requested by the Brazilian Government. Elsewhere, Minister of Mines and Energy Cesar Cals confirmed the construction of the Itataia plant at the beginning of next year for the production of 50 tons of enriched uranium. He added that for next year the priorities of his ministry will be concentrated on increasing petroleum production, greater use of vegetable oils as substitutes for diesel, use of solar energy, development of the Carajas Project and the organization of prospecting claims. The program coordinator, who was in Fortaleza meeting with technicians of the Ceara Development Superintendency seeking an agreement between the German Government and local authorities for research on

environmental production [as published], also said he considers the project for the exploitation of uranium in Itataia to be very significant because as of 2000 the region could begin to use nuclear energy generated by the Santa Quiteria plant. To him Brazil is taking an important step because 30 years from now it will not have water resources for generating power. [As published]. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Dec 81 p 59] 8908

CSO: 5100/2058

ARGENTINE ADVANCES IN NUCLEAR ENERGY SEEN AS THREATENING

Santiago EL MERCURIO in Spanish 7 Dec 81 p A-3

[Text] The policy of nuclear development followed by Argentina over the past three decades has already reached the most advanced stage. After mastering the technology needed to produce electricity by nuclear means and starting up complex facilities to use natural uranium and heavy water, Argentina has now embarked upon the most difficult stage: reprocessing nuclear fuel. One of the consequences of this reprocessing is the production of plutonium, an indispensable element for making atomic bombs and other nuclear devices.

All international policy on the nonproliferation of atomic weapons is precisely based on the objective of impeding access to the reprocessing technology, which is the element making it possible to go from peaceful to nonpeaceful uses of nuclear energy. And yet, demonstrating continuity and perseverance, the Argentine nuclear program has managed to go beyond that obstacle and has achieved complete mastery of the nuclear fuel cycle. India had already achieved similar objectives and other nations such as Israel, Pakistan and South Africa have the necessary technology and capacity in the field.

Argentine officials have emphasized that the plutonium obtained would be used for exclusively peaceful purposes. However, this represents a political decision whose continuation nothing can guarantee in the future. The point is particularly disturbing because the authorities across the Andes have already demonstrated to international public opinion to what extremes they will go in the pursuit of their geopolitical objectives. Moreover, that neighboring country has also begun experiments in rocketry, which could provide an effective means to launch nuclear devices.

As a result, several Latin American nations -- our own in particular -- are now facing for the first time the risk of a nuclear threat in the near future. Conventional options do not seem to offer any adequate safeguard in the field because the Nonproliferation Treaty has shown its ineffectiveness and the Tlatelolco Treaty -- which has not even been ratified by Argentina -- does not constitute a sufficiently solid guarantee either. Various Latin American countries, including Argentina, maintain that the latter permits the so-called "peaceful nuclear explosions," which are technically impossible to distinguish from those for military purposes.

The possibility of being protected by a nuclear umbrella of friendly nations such as the United States is rather remote. Inter-American instruments, such as the Inter-American Mutual Assistance Treaty, have languished in the face of the risks of

armed conflict on the continent, as a result of the political paralysis and distrust that have been created within the system. Bilateral alliances are difficult and generally fairly unreliable because they are usually influenced by considerations of national interest on one side or the other, considerations that often destroy effectiveness.

In addition, the objectives of our country's nuclear program have never been clearly defined and compliance has never been completely satisfactory, which has created a major vacuum. This is a matter that must be corrected in the future with well-established priorities and on the basis of a redefinition of the scope and terms of our entire nuclear policy. Otherwise, the delay that has come about compared with other countries in our region could generate even more dangerous consequences in the years to come.

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CSO: 5100/2053

GENTILLY I NUCLEAR POWERPLANT 'MOTHBALLED'

Montreal LE DEVOIR in French 30 Nov 81 p 10

[Article by Gilles Provost: "Gentilly I Shelved Indefinitely"]

[Text] The "lemon" par excellence of the Canadian nuclear industry--the Quebec power plant Gentilly I--has just been "put into mothballs" and is now considered merely a site for storing radioactive substances.

This prototype, which was supposed to supply 250 megawatts of electricity, in fact operated for only a few hours after its official opening in 1970. This is why the Canadian Atomic Energy Control Commission (AECC) finally withdrew its operating license to replace it with a mere "special controlled substances license."

All the natural uranium fuel has been removed from the reactor. Several hundred tons of heavy water, which made it possible for a chain fission reaction to occur in this fuel, was also drained.

This power plant is an "improved" version of the CANDU system (of Canadian design), and it belongs to Atomic Energy of Canada, Ltd. (AECL). In the beginning, however, it was believed that the "quasi-commercial" power plant could be integrated into the Hydro-Quebec system. Moreover, this Quebec state corporation was responsible for its operation.

Since AECL and Hydro-Quebec do not envisage having Gentilly I operate in the foreseeable future, the new license enables them to reduce personnel on site and relax security measures. In practice this permits Hydro-Quebec to find other work for qualified operators to "fill in" at the Gentilly II power plant, which should be started up in several months.

Atomic Energy of Canada has abandoned the idea of building other power plants on the model of Gentilly I, and this is why it has no intention of investing more of its meagre resources to recondition it. Studies show that starting up this power plant again would require major modifications, likely to cost millions of dollars. Now, the construction of the power plant in the late sixties cost only about $100 million.

Despite everything, the repairs could be relatively profitable, compared with the cost of other power plants to be built, if it were reasonably certain that the power

plant will ultimately operate reliably. Now, nothing is less certain. This is why the negotiations with a view to purchase by Hydro-Quebec are progressing very slowly.

Everything is not at a standstill, however. Like the settlement that Quebec could receive after the construction of the Laprade heavy water plant is halted, the fate of Gentilly I is regularly the subject of negotiations with the federal authorities.

Be that as it may, no one anticipates that the power plant could be reconditioned quickly, and the project is becoming less and less viable as the equipment becomes obsolete and safety standards become more stringent. The license for storing radioactive substances at Gentilly I is valid until December 1983.

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January 20, 1982